JVC

SERVICE MANUAL

MODEL
MI-E60/B
6 CHANNEL STEREO MICROPHONE MIXER

No. 4139
January 1976

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Features

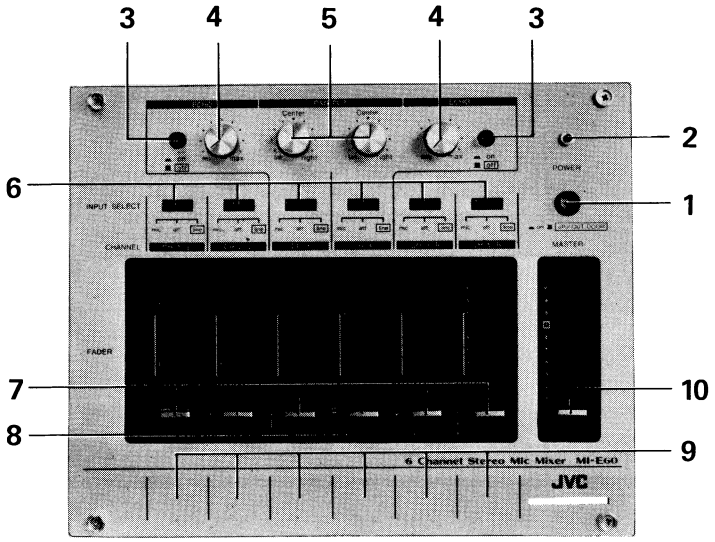
Echo amplifiers for channel 3 and 4.
Microphone attenuators incorporated.
Chennels 3 and 4 have Panoramic Potentiometers.
Passive mode selectable.
Slide markers.
Memo spaces.
Two output circuit.
6-Channel mixing

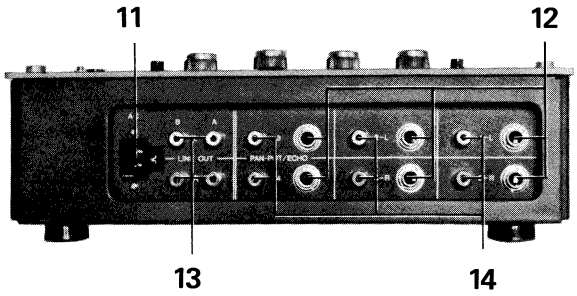
Specifications

Type:	6-channel stereo microphone mixer
Active mode	
Semiconductors:	2 ICs, 14 transistors, 5 diodes
Input terminals:	Minimum input level; –72dBs
Microphone x 6 (standard microphone jacks ¼")	Matching microphone impedance; 600~10k ohms Input impedance; 10k ohms
Line x 6 (pin jacks)	Minimum input level; –20dBs Input impedance; 100k ohms
Output terminals:	Output level with MASTER
Line x 4 (pin jacks)	volume control at MAX; –10dBs Output impedance; 500 ohms or less Load impedance; 100k ohms or more
Crosstalk:	50dBs(at 1kHz)
Frequency response:	30 to 25,000Hz (–3dBs)
Distortion:	0.5% (with microphone input of –72dBs at 1kHz and output of 0dB)
S/N:	MIC 50dB, LINE 53dB
Echo effect:	Reverberation time about 3 seconds. Frequency; 200 – 2,000Hz
Power consumption:	5W
Power supply:	AC 220V, 50Hz (MI-E60) AC 240V, 50Hz (MI-E60B)
Passive mode	
Input terminals:	
Microphone x 6	Input impedance; 10 – 20k ohms (variable with FADER controls)
Line x 6	Input impedance; 100k ohms
Output impedance:	0 – 20k ohms (Variable by MASTER volume control)
Attenuation:	Microphone input; 10 – 13dBs (varied by position of other channel FADER controls) Line input; 36dBs
Crosstalk:	70dBs(at 1kHz)
Dimensions:	270(W) x 75(H) x 221(D)mm 1-1/16" x 2-15/16" x 8-3/4"
Weight:	3kg (6.6 lbs)

Design and psecifications subject to change without notice.

Controls and Connections





1 POWER switch
2 Indicator
3 ECHO switches
4 ECHO controls
5 Panoramic potentiometer (PAN-POT) controls
6 INPUT SELECT switches
7 FADER knobs
8 Slide markers
9 Memo spaces
10 MASTER volume control
11 AC socket
12 Microphone input terminals
13 LINE OUT terminals
14 LINE IN terminals

Fig. 1

New Techniques

1. PAN POT (Panormaic potentiometer)

1) The input signal is distributed to the left and right channels by interconnected variable resistors VR2 and VR3 (these form a panoramic potentiometer). Changing the angle of rotation of these resistors varies the ratio of distribution to the left and right channels, permitting the sound image to be continuously moved from left through center to right.

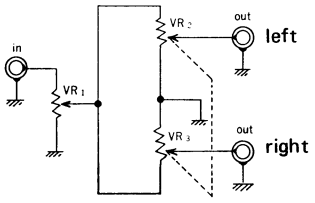


Fig. 2-1

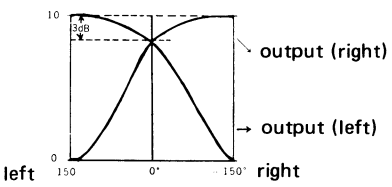


Fig. 2-2

2) The composite output of the left and right channels is constant with a 3dB attenuation in both right and left channels with the PAN POT controls at the center position.

2. ECHO

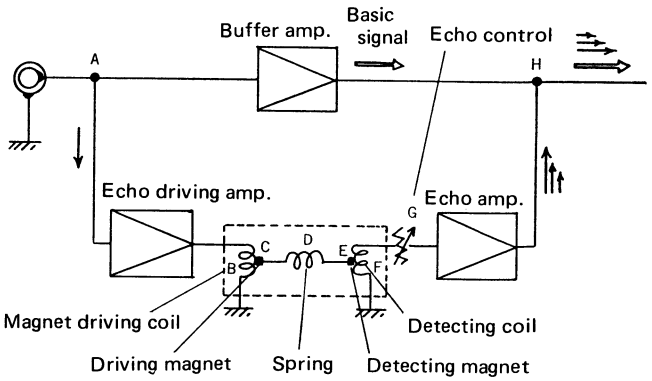


Fig. 3

1) The input signal is divided into the basic signal and the echo component at point A.
2) The echo driving amp. amplifiers the echo component sufficiently to drive the magnet driving coil B.

3) The magnet C linked to the spring D converts the electrical signal into mechanical vibration which vibrates the spring according to the echo signal.
4) The echo signal reflexed and delayed by the spring vibrates the detecting magnet E, inducing a delayed signal is the detecting coil.
5) The echo control G varies the echo time and the ratio of the basic signal to echo component.
6) The signal attenuated by the echo unit is amplified by the echo amp. and is synthesized with the basic signal at point H.
7) The buffer amp. prevents the echo component from returning to point A.

3. Passive and active modes

(Passive mode)

Fig. 4-1 shows the basic mixing circuit, in which resister mixing (passive mode mixing) is done.

Features of this circuit are that it is simple in construction and can be used without a power supply.

It is, however, subject to loss in level due to resistance.

1) Set the power switch to OFF.
2) Set the input selector to LINE.
3) Set the echo switch to OFF.

These positions are indicated with ▭ on the control panel.

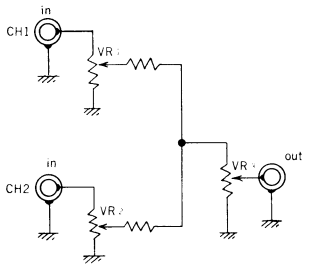


Fig. 4-1

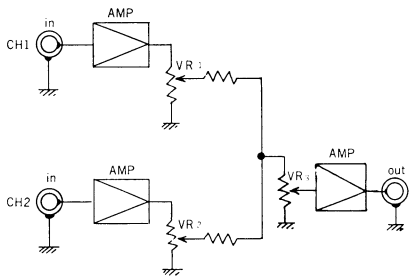


Fig. 4-2

(Active mode)

In Fig. 4-2 amplifiers are added to overcome the drawback of the passive mode.

Since active elements (transistors or tubes) are used for amplification, this circuit is called an active type mixing circuit and is generally used.

This circuit has features that allow amplification of signals without distortion over the wide dynamic range necessary in live-recording.

MI-E60 is designed to be operated in active mode where power is available and in passive mode where power is not available (outdoors, etc.).

Removal of Main Parts

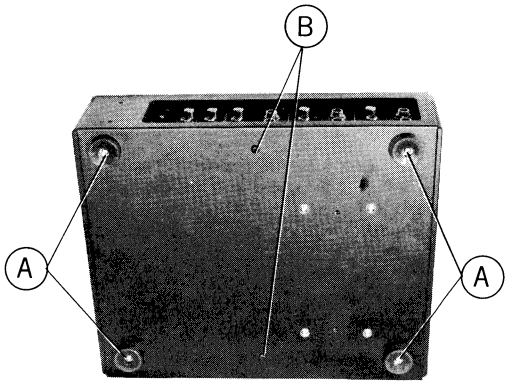


Fig. 5

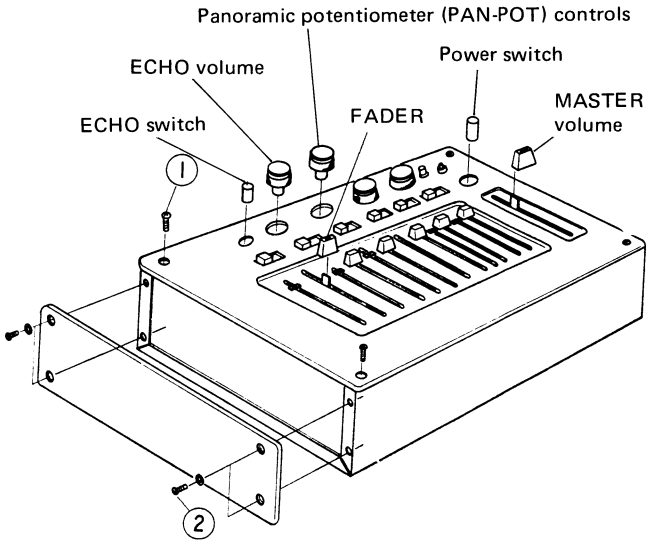


Fig. 6

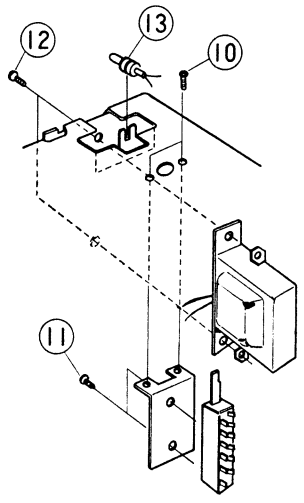


Fig. 7

Order	Part name	Order of removal	Reference No.
1	Knobs	Pull out 1 master volume. 6 faders. 2 PAN POT controls. 2 echo controls. 1 power switch. 2 echo switches.	
2	Front panel	Remove 4 screws.	(1)
3	Control plate	Remove 4 fixing screws. Remove 2 screws and 2 brackets.	(3) (C) (D)
4	Main cabinet	Remove 4 rubber pads. Remove 2 screws.	(A) (B)
5	Power circuit board	1) Remove 2 power circuit board fixing screws. 2) Pull out the socket from the main circuit board.	(8)
6	Main circuit board	1) Remove the 9 slide resistor fixing screws. (Faders, master volumes, etc.) 2) Remove the 6 select switch fixing screws.	(4) (5)
7	Echo switch	Remove 2 fixing screws.	(6)
8	Variable resistor	Remove 1 washer and 1 nut.	(7)
9	Terminal board	Remove 6 fixing screws.	(9)
10	Power switch	Remove 2 bracket fixing screws. Remove 2 switch fixing screws.	(10) (11)
11	Power transformer	Remove 2 transformer fixing screws and 2 nuts.	(12)
12	Pilot lamp	1) Remove the pilot bushing. 2) Pull out the pilot lamp from the bushing.	(13)
13	Echo bracket	1) Pull out the wire socket from the echo circuit board. 2) Remove 4 bracket fixing screws.	(14) (15)
14	Echo unit	Remove 2 tapping screws from each unit.	(16)
15	Side panel	Remove 4 screws from the right and 4 screws from the left side of the panel.	(2)

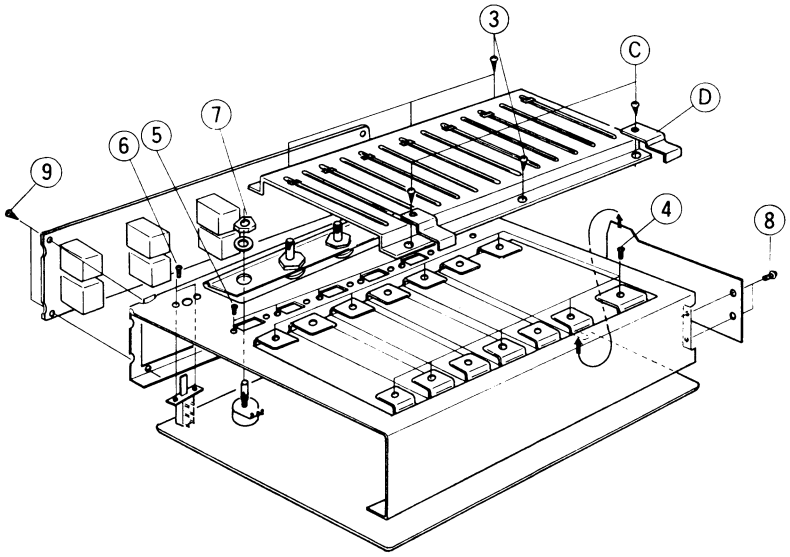


Fig. 8

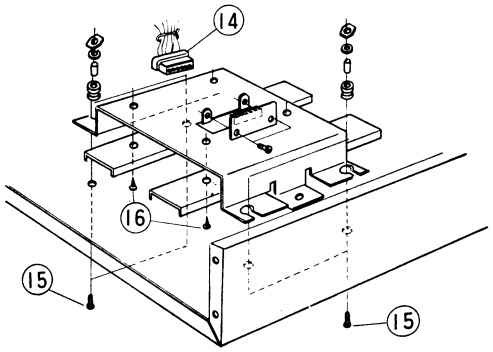


Fig. 9

Block Diagram

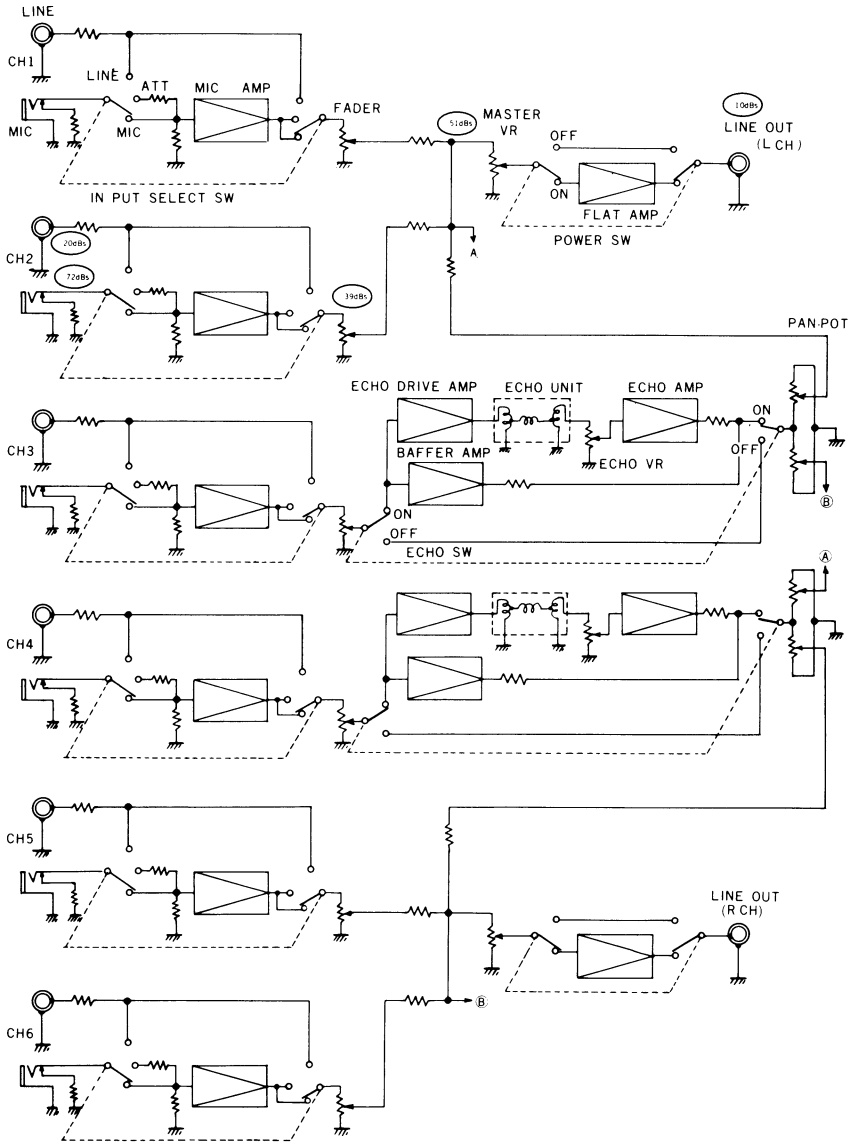


Fig. 10

Trouble Shooting

A. Passive mode

Sound is too small

1) Check that each switch is set to the passive position.
2) Check that the LINE OUT of this equipment is connected to the MIC INPUT of the deck.
3) Use high sensitivity microphones.

B. Active mode

Echo is not effective

1) Check that the echo switch is set to ON.
   Check that the echo control is not set to MIN.
2) Echo driving amp. (IC301 or IC401) is defective.
   Echo amp. (Tr702 or Tr802) is defective.
   Echo unit is defective.

Echo is distorted

1) Echo channel input voltage is too high.
   Turn down the fader so that the reading of the VU meter of the tape recorder does not exceed 0VU.
2) Check that objects (wire, etc.) do not touch the echo unit.

Sound is too small

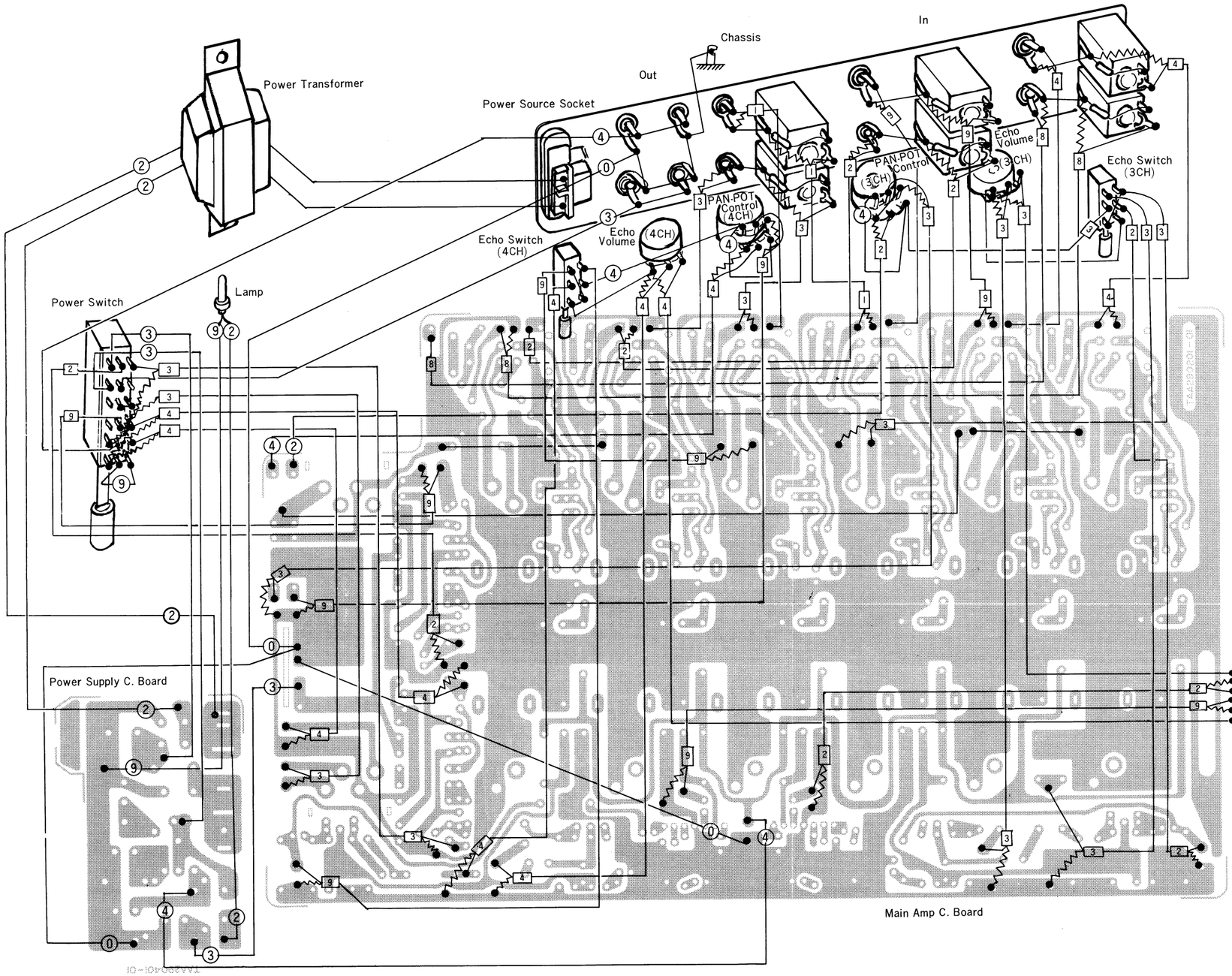
1) Check that each switch is set to the active position.
2) When microphones are connected, check that the INPUT SELECT switch is set to ATT or LINE.

C. The left channel signal is heard from the right channel (or vice versa).

Check that the PAN POT control is set correctly.

For other symptoms, check the circuit board for voltages at necessary points as is the case with ordinary amplifiers.

Wiring

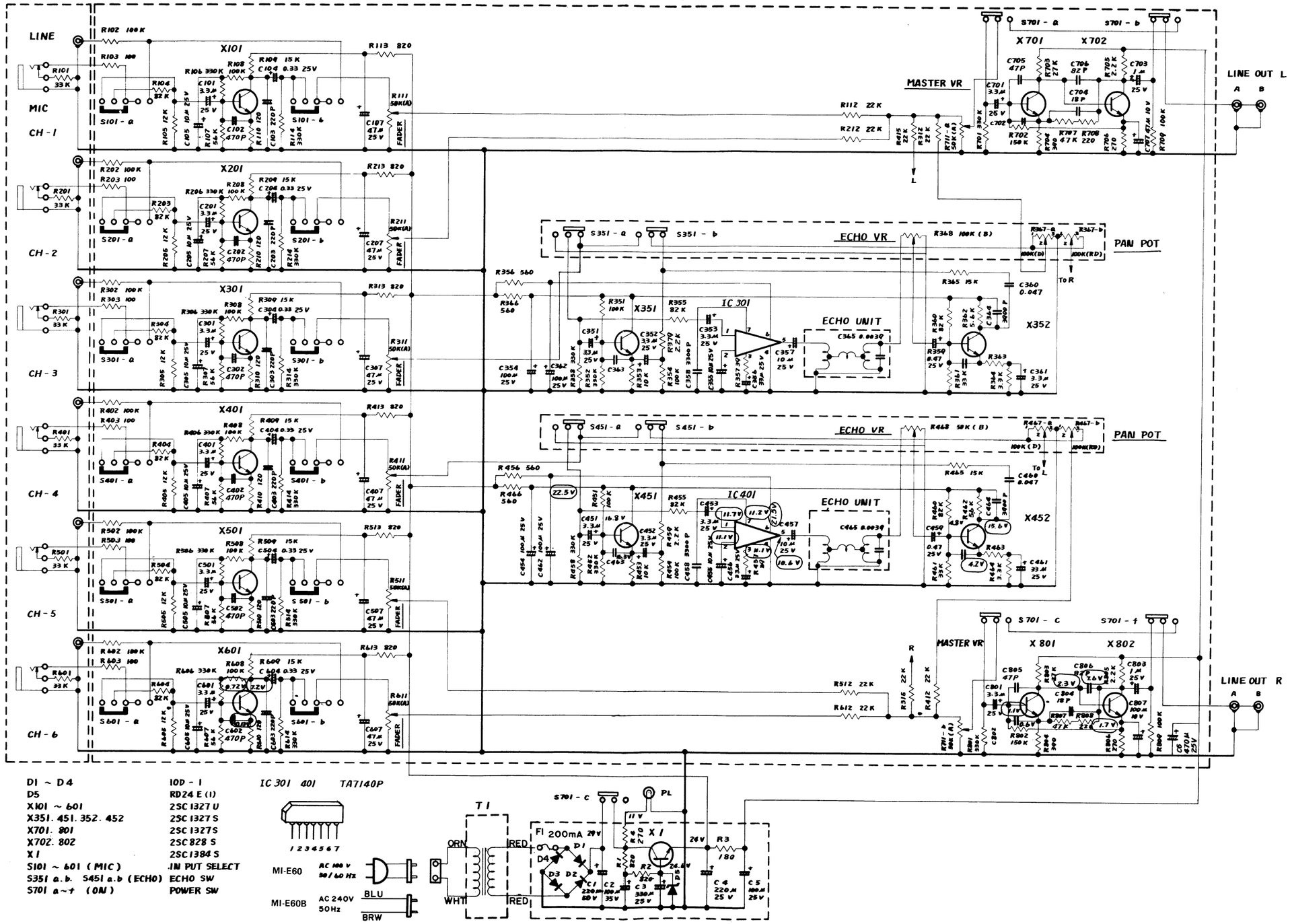


Color code are shown below

1	.....	Brown
2	.....	Red
3	.....	Orange
4	.....	Yellow
5	.....	Green
6	.....	Blue
7	.....	Violet
8	.....	Grey
9	.....	White
10	.....	Black

Fig. 11

Standard Schematic Diagram of MI-E60/B



D1 ~ D4	10D - 1
D5	RD24 E (1)
X101 ~ 601	2SC 1327 U
X351. 451. 352. 452	2SC 1327 S
X701. 801	2SC 1327S
X702. 802	2SC 828 S
X1	2SC1384 S
S101 ~ 601 (MIC)	IN PUT SELECT
S351 a.b. S451 a.b (ECHO)	ECHO SW
S701 a~f (ON)	POWER SW

Fig. 12

Circuit Board Parts

Power Supply Circuit Board

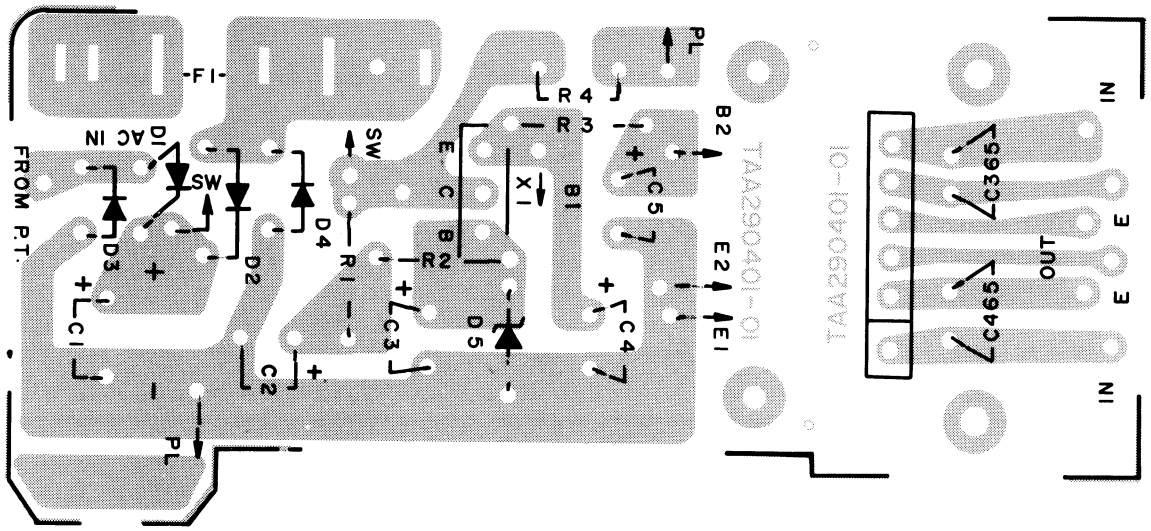


Fig. 13

Power Supply Circuit Board Parts List

Ref. No.	Parts No.	Parts Name	Remarks		Q'ty
(Power Supply Ass'y)					
R1,2	QRD142K-821	C. Resistor	470Ω	¼W	2
R3	" -181	"	180Ω	"	1
R4	QRG026J-271	"	270Ω	2W	1
C1	QEW41HA-227	E. Capacitor	220μF	50V	1
C2	QEW41VA-107	"	100μF	35V	1
C3	QEW41EA-337	"	100μF	25V	1
C4,5	" -227	"	220μF	"	2
D1~4	T30155-001	Si Diode			4
D5	RD24E(1)	Ze Diode			1
X1	2SC1384S	Transistor			1
F1	QMF51A2-R20	Fuse	200mAT		1
	TAZ000331-02	Contact Clip			2
	TAZ000445-02	Fuse Seel	200mAT		1
C365,465	QCY41HK-392	F.C. Capacitor			2

Main Circuit Board

Red print are shown voltage (V)

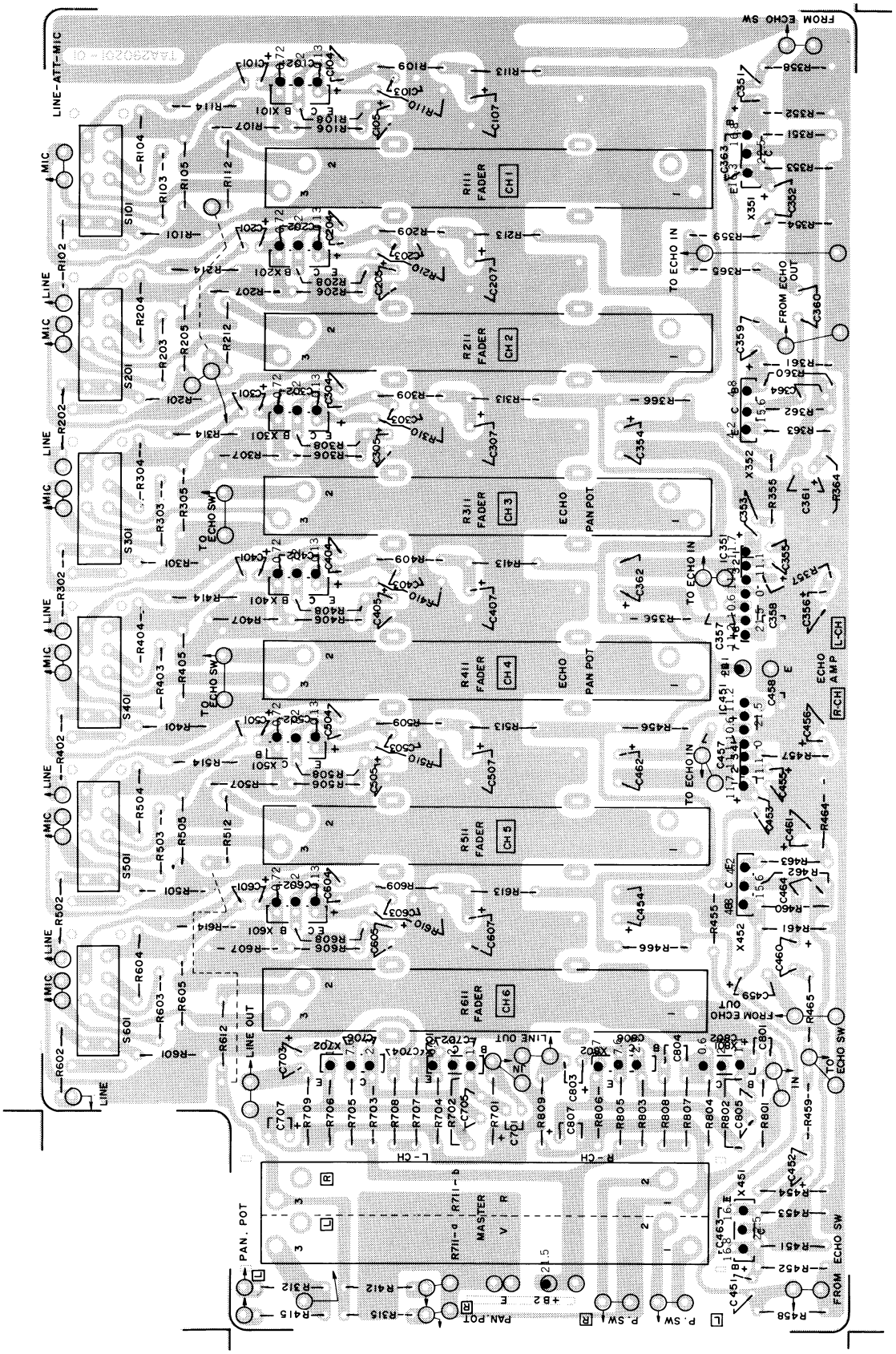


Fig. 14

Main Circuit Board Parts List

Ref. No.	Parts No.	Parts Name	Remarks		Q'ty
(MIC AMP Section)					
R101~601	QRD142K-333	C. Resistor	33kΩ	¼W	6
R102~602,108, 608	〃 -104	〃	100kΩ	〃	12
R103~603	〃 -101	〃	100kΩ	〃	6
R104~604	〃 -823	〃	82Ω	〃	6
R105~605	〃 -123	〃	12kΩ	〃	6
R106~606	QRZ0019-334	〃 (Low noise)	330kΩ	〃	6
R107~607	〃 -563	〃 (〃)	56kΩ	〃	6
R109~609	QRD142K-153	〃	15kΩ	〃	6
R110~610	〃 -121	〃	120Ω	〃	6
R112~612	〃 -223	〃	22kΩ	〃	6
R113~613	〃 -821	〃	820Ω	〃	6
R114~614	〃 -334	〃	330kΩ	〃	6
C101~601	QEE41EM-335	T.S.E. Capacitor	3.3μF	25V	6
C102~602	QCS11HK-471	F.C. Capacitor	470PF	50V	6
C103~603	〃 -221	〃	220PF	〃	6
C104~604	QEB41EM-334	E. Capacitor (Low leak)	0.33μF	25V	6
C105~605	〃 -106	〃	10μF	〃	6
C106~606	QEW41EA-476	〃	47μF	〃	6
X101~601	2SC1327U	Transistor			6
(ECHO AMP Section)					
R351,451	QRD142K-104	C. Resistor	100kΩ	¼W	2
R352,358,452,458	〃 -334	〃	330kΩ	〃	4
R353,453	〃 -103	〃	10kΩ	〃	2
R354,454	〃 -104	〃	100kΩ	〃	2
R355,360,455,460	〃 -823	〃	82kΩ	〃	4
R356,366,456,466	〃 -561	〃	560Ω	〃	4
R357,457	〃 -390	〃	39Ω	〃	2
R358,458	〃 -334	〃	330kΩ	〃	2
R359,459	〃 -222	〃	2.2kΩ	〃	2
R361,461	〃 -333	〃	33kΩ	〃	2
R362,462	〃 -562	〃	5.6kΩ	〃	2
R363,463	〃 -470	〃	47Ω	〃	2
R364,464	〃 -332	〃	3.3kΩ	〃	2
R365,465	〃 -153	〃	15kΩ	〃	2
R367,467	〃 -221	〃	220Ω	〃	2
X351,352,451,452	2SC1327S	Transistor			4
IC351,451	TA7140PC	IC			2
C351,451	QEE41EM-335	T.S.E. Capacitor	3.3μF	25V	2
C352,353,452,453	QEB41EM-335	E. Capacitor	3.3μF	〃	4
C355,455	QEW41CA-106	〃	10μF	16V	2
C356,361,456,461	〃 -336	〃	33μF	〃	4
C357,457	QEW41EA-106	〃	10μF	25V	2
C354,362,454,462	〃 -107	〃	100μF	〃	4
C359,459	QEB41HM-474	〃	0.47μF	50W	2
C358,458	QCY41HK-332	F.C. Capacitor	3300PF	50V	2
C363,364,463,464	〃 -102	〃	1000PF	〃	4
C365,465	〃 -392	〃	3900PF	〃	2
C360,460	QFM41HK-473	Mylar Capacitor	0.047μF	〃	2
(LINE AMP Section)					
R701,801	QRD142K-334	C. Resistor	330kΩ	¼W	2
R702,802	〃 -154	〃	150kΩ	〃	2

Ref. No.	Parts No.	Parts Name	Remarks		Q'ty
R703,803	QRD142K-273	C. Resistor	27kΩ	¼W	2
R704,804	〃 -391	〃	390Ω	〃	2
R705,805	〃 -222	〃	2.2kΩ	〃	2
R706,806	〃 -271	〃	270Ω	〃	2
R707,807	〃 -473	〃	47kΩ	〃	2
R708,808	〃 -221	〃	220Ω	〃	2
	QRD143K-103	〃	10kΩ	〃	2
R709,809	QRD142K-104	〃	100kΩ	〃	2
C701,801	QEB41EM-335	E. Capacitor	3.3μF	25V	2
C702,802	QCY41HK-102	F.C. Capacitor	1000PF	50V	2
C703,803	QEW41EA-105	E. Capacitor	1μF	25V	2
C6	〃 -477	〃	470μF	〃	1
C704,804	QCS11HK-180	F.C. Capacitor	18PF	50V	2
C705,805	〃 -470	〃	47PF	〃	2
C706,806	〃 -820	〃	82PF	〃	2
C707,807	QEW41AA-107	E. Capacitor	100μF		2
X701,801	2SC1327S	Transistor			2
X702,802	2SC828S	〃			2

Components

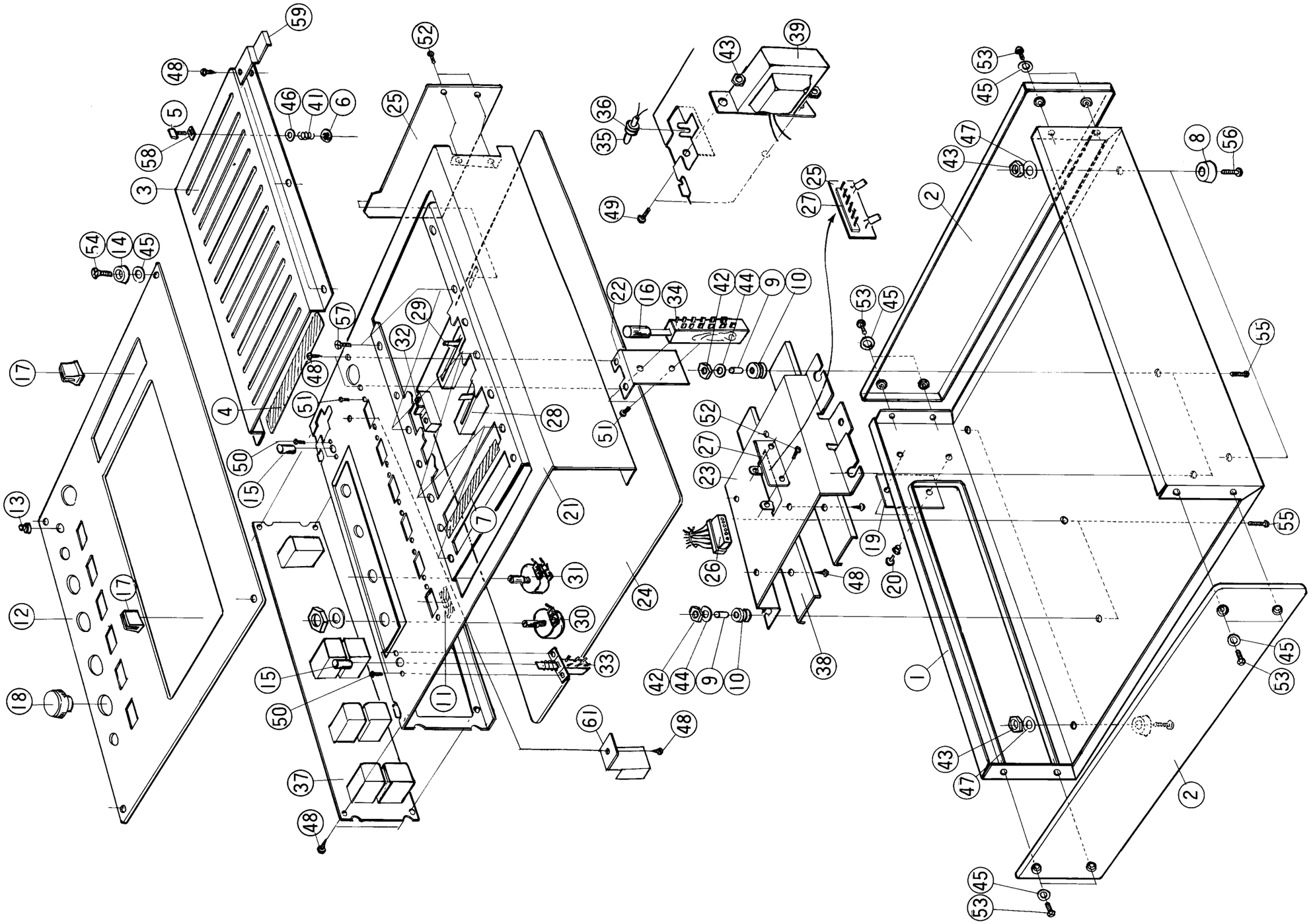


Fig. 15

Component Parts List

Ref. No.	Parts No.	Parts Name	Remarks	Q'ty
1	*TJC290202-01	Case	(main)	1
2	*TJC290304-01	"	(side)	2
3	*TJP290305-01	Control Plate		1
4	*TJN290403-01	Blind	for Volume	1
5	*TJK290404-01	Volume Marker		6
6	RDS2000Z	"CS" Ring		6
7	*TJN290407-01	Blind		6
8	QZF2308-001	Foot		4
9	*T30302-068	Coller	for Bracket	4
10	*TER290406-01	Rubber Bushing		4
11	*TJN290405-01	Blind	for Slide SW	6
12	*TJP290204-02	Front Plate		1
13	T42244-00A	Lamp Cover Ass'y		1
14	T46078-001	Special Washer	for Front panel	4
15	TJK000470-03	Knob		2
16	TJK000470-02	"		1
17	TJK027302-01	Slide Knob		7
18	TJK271463-0A	Knob Ass'y		4
19	TJL000313-88	Name Plate	(MI-E60)	1
	TJL000313-89	"	(MI-E60B)	1
20	E48729-002	Plastic Rivet		2
21	*TFC290203-01	Chassis		1
22	*TFB290402-01	SW. Bracket		1
23	*TFB290306-01	Bracket	Echo bracket	1
24	*TAA290201-01	Circuit Board (1)		1
25	*TAA290401-01	" (2)		1
26	QMC0657-001	Socket Ass'y		1
27	QMC0627-001	Plug Ass'y		1
28	*QVT6C6A-054M	Slide Resistor	Fader R111,611	6
29	QVZ5013-001	"	Master R711 (a,b)	1
30	QVF1A2B-054	V. Resistor	Echo R368,468	2
31	*QVZ1707-001	"	PAN-POT R367,467	2
32	*QSS2301-002	Slide SW	Select S101~601	6
33	*QSP2210-041	Push SW	Echo S302,402	2
34	*QSP6210-002	"	S701 (a-f)	1
35	T46821-004	Pilot Lamp	PL1	1
36	53492	Bushing	for Pilot lamp	1
37	*TAJ290301-02	Jack Board Ass'y		1
38	*TDZ290302-01	Echo Unit		2
39	TAP314301-01	Power Transformer	(MI-E60)	1
	TAP315301-01	"	(MI-E60B)	1
41	T30301-017	Spring	Fader marker	6
42	NTB2600	Nut	Bracket, Power trans	6
43	NTB3000	"	Foot	4
44	Q03091-130	Washer	Echo bracket	4
45	Q03093-115	"	Case, Chassis, Front panel	14
46	Q03093-501	"	Fader marker	6
47	WNB3000N	"	Foot	4
48	SBSB3006Z	Tapping Screw	Fader marker, Jack board, Echo unit, SW. bracket, Shield plate	19
49	DPSP2608Z	Screw	Power trans	2
50	LPSP2004Z	"	Push switch	4
51	LPSP2604Z	"	Switch, Select switch	10
52	LPSP3006ZS	"	Circuit board, Echo bracket	6
53	SDBP3006RS	"	Case, Chassis	10
54	SHBP3008RS	"	Front panel	4
55	SPBP2625N	"	Bracket	4
56	SPSP3010NB	"	Foot	4
57	SSSP3004ZS	"	for Slide resistor	14
58	TJN290408-01	Slide Washer		6
59	TFB290409-01	Bracket		2
60	QMC0263-001	AC Socket Ass'y		1
61	TFB290410-01	Shield Plate	for AC socket	1
62	V44399-00A	Cap	"	1
63	LPSP2610N	Screw	"	2

Packing

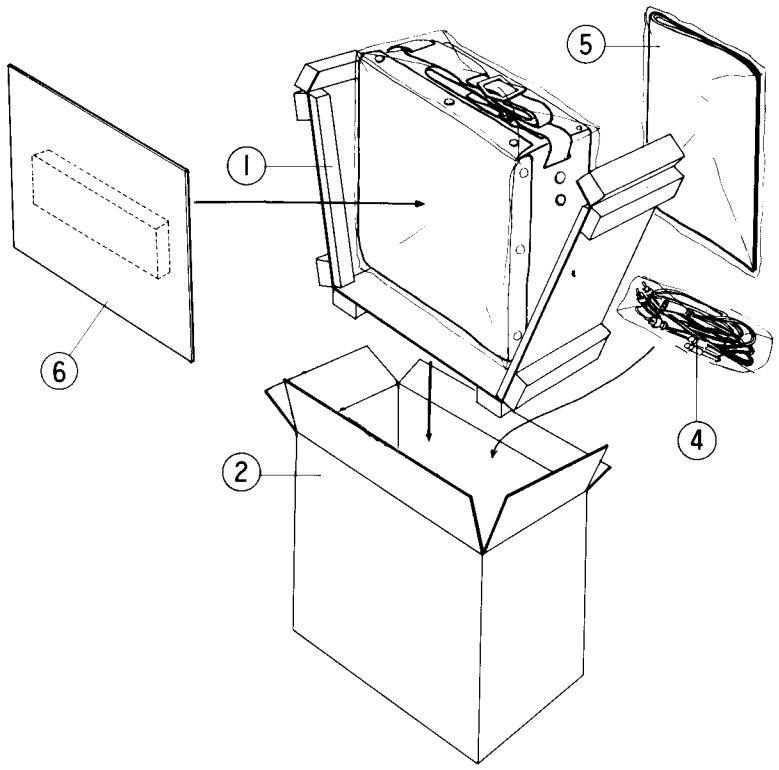


Fig. 16

Packing List

Ref. No.	Parts No.	Parts Name	Remarks	Q'ty
1~2	*TKB290307-0C	Packing Case Ass'y		1set
1	*TKB290307-02	Cushion		1
2	*TKB290307-04	Case		1
	T6800-00A	Envelope	for Set	2
	AP4056A-035	"	for Pin cord ass'y for Power cord with plug	1
	AP4056A-077	"	for Inst book	1
6	TKB290307-03	Cushion		1

Accessories

Ref. No.	Parts No.	Parts Name	Remarks	Q'ty
4	QMP3950-183	Power Cord with Plug	MI-E60	1
4	QMP9017-006	"	MI-E60B	1
4	T30046-00A	Pin Cord Ass'y		1
4	TAZ000467-01	MIC Plug with Pin Jack		1
5	T7385EGF	Instruction Book		1
	TLC290101-0B	Carrying Case Ass'y		1